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ORIGINAL ARTICLES.

STUDY OF THE PATHOLOGICAL ANATOMY OF PULMONARY GLANDERS.

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I.

Glanders in the lungs of the horse assumes a great variety of anatomical features, according to the mode of evolution of the lesions. While the acute forms are manifested by extensive and diffused alterations, similar to those attending purulent infection, those of a chronic nature are essentially characterized by diminutive and limited neoformations of a tuberculous appearance.

The works which have been devoted to the special study of the lesions of *acute glanders,* are but few in number. J. Renault* has shown that they consist of the presence of confluent centers of pneumonia, analogous to those of pyemic infection. The alveoli are filled with white globules; the endothelium of the vesicles is no longer present; the alveolar walls are infiltrated with embryonic cells; a translucid sheath,

*J. Renault, Art. Morve, Dict. Sciences Medic., 1876, Vol. x. p. 148.

formed by an old hemorrhage, is spread around the nodule, and at this point the vesicles contain granular or fibrillar fibrine, discolored, red corpuscles, and large, round cells. "These are simply endothelial cells of the lung, which, becoming active and globular, are thus enabled to surround and envelop, and destroy the red corpuscles."

The very complex alterations of *chronic glanders* have been the object of numerous researches. *Dupuy has recognized in the pulmonary tubercle the anatomical characteristics of the disease, and insists upon the absolute diagnostic signification of the lesion, and he considers glanders in the horse as analogous to "tuberculous disease" in man.

†Virchow, who undertakes the histologic analysis of the neoformation, confirms the resemblance established between glanderous granulation and the true tubercle. Both are due to a proliferation of the nuclei of the conjunctive tissue, due to an acrid or irritating agent, and constituted by an agglomeration of small cells, and by the elastic fibres of the primitive tissue. Thus formed, the nodules undergo, in their central part, a caseous degeneration. And again, melastatic alterations may be seen in the lung, under the form of irregular centers, projecting above the inflamed parenchyma, and possessing most commonly the characters of the parts affected with lobular pneumonia. They sometimes assume large dimensions, as those of a nut or an apple, and soften and form a mass of detritus, and then much resembe the great centers of tuberculous infiltration.

‡Ravitsch systematically defines the glanderous lesion to be a thrombosis of the venous and lymphatic vessels, giving rise to disturbances of nutrition in the surrounding parts. In its incipiency, the tubercle is indicated only by a fibrinous intra-alveolar exudate, containing some leucocytes, but later

*Dupuy, de l'affection tuberculeuse vulgairement appelie movde—Paris 1817.

†Handbuch der specielle Patho. 1855, vol. II., p. 405—Pathol. des tumeurs —1869, vol. II., p. 541.

‡Ravitsch, Einige Worte ueber die Pathogenese der Rotz und Wurmkrankheit des Pferdes, Virchow's Arch., 1892, vol. XXIII., p. 33.

inflammation appears and gives origin to the alveolar membrane, with a multiplication of the fixed elements of the tissue.

*Leisering confirms the ideas of Virchow in regard to the histological constitution of the tubercle. He admits that the lesion is developed in the interstitial connective tissue, under the influence of a contagium received directly into the parenchyma by the inspired air.

He also mentions a peculiar anatomical form (infiltrated glanders) characterized by diffuse inflammations of the connective tissue, and at times spreading between the lobules, around the bronchia and blood vessels.

†Trasbot and Cornil give a concise description of a glanderous granulation, developed around a bronchia. This tissue is constituted by numerous fibres of elastic laminous tissue, forming an extremely close network, in which are found spherical nuclei, some of which are surrounded with protoplasmic granulations.

‡Rabe publishes a very good study of the pathological anatomy of the various localizations of glanders. The pulmonary tubercle develops itself in the centre of the parenchyma, and includes a varying number of alveoli. At the beginning, a thickening of the partitions occurs; then these, infiltrated with nuclei, give the idea of a tissue in a condition of rapid proliferation; round cells are also found in the alveoli, and a more complete examination shows that these cells are specially abundant around the capillaries, and that, in reality, the tissue of granulation starts from the surface of the capillaries, which are the source of the round or elliptic elements which infiltrate the tissue; the alveoli and the alveolar epithelium have no part in their production. At a later period, the alveolar cavities are entirely filled with a tissue of granulation, which may form into cellular tissue, while

*Leisering, zur Pathologischen Anatomie des Rotzes, Sachs Veterin. Bericht, 1862.

†Trasbot and Cornil. Note sur la structure des granulations morvenses du cheval: Soc. de Biolog. 1866, vol. XVII., p. 218.

‡Rabe, zur Pathologischen Anatomie und Histologie der Rotz Krankheit, Talvarber K. Thierarzmischule zu Hannover, 1877-1881.

on the periphery of the center, the inflamed alveolar cavit es unite to form the fibrous envelope of the tubercle. Rabe, again, insists upon the diversity of the pulmonary accidents observed in chronic glanders, and especially upon the alterations in the lymphatic vessels, the obstacles interposed to the circulation giving rise to a stasis of the lymph and to the œdema and gelatinous infiltration of the tissues, and later to their induration. This is the explanation of the lesions of the interlobular tissue and those of the lymphatic sheaths which surround the vessels and the bronchia.

*Czokor studies only the glanderous tubercle, and distinguishes it histologically from the lesions which are proper to true tuberculosis. When these are constituted by an irregular agglomeration of very small centers, the neoformation of glanders always assumes a well-marked, rounded form, and is constituted at once by a single center of inflammation. The histological examination shows that the nodule of glanders begins with the cloudy tumefaction and dropping of the alveolar epithelium, and soon after, upon a section of the part, a central detritus appears composed of an accumulation of round, granular cells and dissociated vesicular walls. The degeneration becomes less marked as the examination recedes from the center, while at the periphery the round cells have kept their form and their characters. The central four are circumscribed by a compact zone, of variable thickness, formed by an infiltration of leuocytes in the alveoli, and lastly, a third external layer is composed of a dense, indurated cellular tissue, which constitutes an isolating envelop for the inflammatory center:

†Laulanie gives a very exact description of the old glanderous tubercle. In the center is a caseo-purulent mass, very brittle, which can be squeezed out at the post mortem, and which very frequently drops off while specimens are being mounted; around this central zone is another of proliferation,

*Czokor, Vergleichende Patholog-anatom. Studien ueber den Rotz und die Tuberculose des Pferdes. Revue fur Thierheilkunde, 1885, 1886.

†Laulanie, Etude critique and experimentale sur les cellules geantes normales and pathologiques, Paris, 1888.

formed of epithelioid cells, among which at times giant cells appear; then comes a fibrinous zone, which surrounds the others and tightly presses them; and then a zone of interstitial pneumonia, frequently containing epithelioid and giant cells in its alveoli.

This concise review is sufficient to show that the lesions of glanders with slow growth are as yet incompletely determined as to their form, though much discussed as to their significance. In the researches which we have prosecuted it has been principally our design to determine certain points of study which would probably be the most advantageous and interesting to pursue.

(*To be continued*).

VIRULENCE OF THE BLOOD AND MUSCLES IN TUBERCULOSIS.

*By J. M'Fadyean, M.B., B.Sc., F.R.S.E., Royal Vet. College, Edinburgh.

Ought tuberculosis to be regarded as a disease *totius substantiæ*—one in which the agents of infection are distributed throughout the entire system, or is it in the majority of cases a local affection?

Considering the immense amount of research that has within the past two decades been devoted to tuberculosis, it is not a little surprising that opinion should still be sharply divided regarding this point, which is one of supreme importance from its bearing on the etiology and prophylaxis of the disease.

If tuberculosis is in the vast majority of cases a local disease, in which the bacilli are confined to the visibly altered parts at or near the point where they have found a port of entrance into the tissues, it is obviously improbable that hereditary transmission can play a great *role* in the propagation of the disease. Again, if tubercle bacilli are only exceptionally distributed throughout the entire body, the ground is to a large extent cut from the feet of those who maintain that the total seizure of every tuberculous carcase

*Reprint from *Journal of Comparative Pathology and Therapeutics.*

is necessary in order to protect human beings from the risk of infection through the ingestion of tubercle bacilli in the flesh of animals.

On the other hand, if it can be shown that the agents of infection are frequently disseminated throughout the system, there is at least nothing improbable in the supposition that the fœtus may in many cases be infected *in utero;* and the practice of partial condemnation of tuberculous carcases must be pronounced inadequate to safeguard the public health.

There are several lines along which the information necessary to guide to a correct conclusion regarding these disputed points may be sought. In the first place it is obvious that a study of the distribution of the lesions in naturally contracted cases of tuberculosis is fitted to throw light on the mode of dissemination of the bacilli within the body, and to furnish evidence for or against the theory that the blood-stream is a common vehicle for the transport of these organisms. In the second place we may call in the aid of experiment, introduce tubercle bacilli into the blood-stream, and observe whether the resulting lesions have a distribution agreeing with that observed in natural cases of the disease. Or, finally, we may in cases of natural or experimental tuberculosis institute a search for tubercle bacilli in the various fluids and tissues of the body, either by direct microscopic examination or by inoculating these fluids and tissues into the bodies of animals known to be easily infected with the disease. The main purpose of this article is to record the result of some investigations that I have recently carried out along the last mentioned line of inquiry.

1. Experiments with the Blood of Tuberculous Animals.

Before proceeding to state the details of these experiments, it may be well to describe the precautions that were taken with a view to preventing accidental infection of the experimental animals.

In each instance the blood was taken from the jugular

vein. The hair having been clipped closely from the middle part of the jugular furrow, the skin was washed with a strong solution of mercuric chloride in water. The fleam or lancet used to open the vein was sterilized in a 5 per cent. solution of carbolic acid in water, and the vessel in which the blood was caught had previously been sterilized, either by exposure to dry heat for one hour at 160° C., or by steaming for half an hour at 100° C., and for a subsequent quarter of an hour at 115°-120° C. The blood was defibrinated by whipping with a bunch of iron wires previously heated to redness in the flame of a Bunsen burner. The blood was injected into the peritoneum with an extemporized instrument on the principle of Koch's syringe. This instrument consisted simply of a hypodermic needle attached to one end of a piece of glass tubing either by cement capable of resisting a dry temperature of 160° C. or by a short piece of rubber tubing embracing both needle and glass tube at their point of contact. In the latter case the instrument was sterilized by steaming in an autoclave for half an hour at 100° C. and then for a quarter of an hour at 120° C. In inoculating the expelling force was obtained by attaching the ball of a "hand spray apparatus" to the free end of the glass tube.

EXPERIMENT I.—The blood in this case was taken from a cow with enormous tuberculous tumors (lymphatic glands) in the parotideal region and in front of the shoulder. Each of three full-grown rabbits had 6.8 cc. of the defibrinated blood injected into the peritoneum.[1] All three rabbits were killed 41 days after inoculation. The peritoneum and all the organs of the qody appeared to be perfectly normal, save

[1] I may here remark that as long as the material used is bland and unirritating, such as blood, milk, or meat juice, intra-peritoneal inoculation is a simple and apparantly almost painless operation. In the earlier experiments, in which the blood was injected cold, the animals for a few minutes after the operation lay prone on the abdomen with the hind legs extended, but since I have adopted the method of raising the liquid to be injected to the body temperature, the animals have in general borne the operation without any sign of discomfort. When the stomach and intestines are not overloaded with food materials 5 cc. or more may be injected into the peritoneum of a full-grown guinea-pig and twice that amount into a rabbit.

that in one animal the liver contained a few white specks of psorospermosis.

EXPERIMENT II.—This experiment was almost an exact repetition of the foregoing one, save that only 2 rabbits were inoculated, and that the quantity of blood injected into each was 5 cc. The cow from which the blood was taken was the subject of extensive tuberculosis of the lungs and bronchial glands.

Both rabbits were killed 40 days after inoculation. In one of them the *post-mortem* revealed no lesion whatever; the liver of the other contained a few white specks of psorospermosis, but the peritoneum and all the other organs were healthy.

In neither of these two experiments was the distribution of the lesions in the cow from which the blood was taken such as to indicate a generalized tuberculosis. In the following three experiments the blood was taken from horses in which the conditions of a generalized tuberculosis had been experimentally produced by injecting tubercle bacilli into the blood stream. Each horse was infected as follows: about a tablespoonful of caseo-pus from a tuberculous tumor of the spleen of a horse was well shaken in a test tube with 30 cc. of sterilized tap-water. The milky fluid thus obtained was poured into a conical glass and allowed to stand for a few minutes until the coarser particles had settled to the bottom. Eight cc. of the still milky upper strata of the liquid were then sucked into a syringe and injected into the jugular vein of each of the three horses. What I have here termed caseo-pus is the diffluent whitish material which in some cases of equine tuberculosis constitutes the bulk of the tumors found in the spleen, and which, in my experience, is above every other form of tuberculous lesion rich in bacilli. The annexed figure is from a photograph[1] of a cover-glass preparation made from the liquid injected into the jugular vein of the horse referred to in Experiment IV. When it is reflected

[1] This photograph was kindly made for me by Mr. P. D. Coghill of the Royal Veterinary College, London.

that the bacilli here shown formed an infiinitesimal fraction of those present in the cover-glass film, and that 5 cc. of a liquid equally rich in bacilli were injected into each horse, it will

TUBERCLE BACILLI FROM HORSE (x 1000). The larger spots represent solid masses of bacilli in which the outlines of the single rods were not clearly distinguishable (see text).

readily be admitted that such an enormous number of these organisms can seldom or never in the course of nature be thrown into the blood-stream of a tuberculous animal. That the bacilli were fully virulent was abundantly proved by the enormous number of miliary tubercles found in the lungs of these horses when they were afterwards killed.

EXPERIMENT III.—Each of two guinea-pigs received into the peritoneal cavity 5 cc. of defibrinated blood withdrawn from the jugular of a horse 24 hours after it had been inoculated intravenously, as already described, with a liquid rich in tubercle bacilli.

One guinea-pig was killed on the 27th, and the other on the 28th day after inoculation; in both the peritoneum was absolutely healthy, and no trace of tuberculosis was discoverable in any organ of the body.

EXPERIMENT IV.—This experiment was similar to the preceding one, but the blood was from a different horse and withdrawn 20 hours after the intra-venous inoculation. One of the guinea-pigs received 4 cc. and the other 2 cc. of the defibrinated blood.

Both guinea-pigs were killed 23 days after inoculation, and the *post-mortem* showed in neither case the least trace of tuberculosis.

EXPERIMENT V.—In this instance the blood was withdrawn (from a third horse) 48 hours after the intra-venous inoculation, and after defibrination 5 cc. of it were injected into the peritoneum of each of two guinea-pigs.

Both guinea-pigs were killed 34 days after inoculation, and both were found to be absolutely healthy.

2. EXPERIMENTS WITH MEAT JUICE.

The following three experiments were made with the juice expressed from the muscles of the three horses referred to in connection with the foregoing series. And here again, although the results were negative, or rather because they were negative, it appears desirable to state that at every step strict precautions were taken to exclude the risk of accidental infection of the animals under experiment. The superficial dissection required to expose the muscles was made with a sterilized knife, and a second sterilized knife was used to cut out the portions intended to furnish the juice for inoculation. In each case the muscular tissue was taken from the pectoral region, and the juice was expressed from it by means of a sterilized meat-press, and received in sterilized vessels. The syringe used for inoculation was of the extemporized pattern previously described, and in each case it was carefully sterilized before use.

EXPERIMENT I.—Two guinea-pigs were inoculated intra-peritoneally with muscle juice, one receiving 4 cc. and the other 3 cc. The juice was obtained from the muscular tissue of a horse killed 10 day after 5 cc. of a liquid enormously rich in tubercle bacilli had been injected into the jugular vein.

Both guinea-pigs were killed 26 days after inoculation, and found to be perfectly healthy.

EXPERIMENT II.—The material used for inoculation in this case was the juice expressed from the muscular tissue of a horse into whose jugular vein an enormous number of tubercle bacilli had been injected sixteen days prior to its death. Of this juice 5 cc. were injected into the peritoneum of each of two guinea-pigs.

Both guinea-pigs were killed 21 days after inoculation, and the *post-mortem* showed the peritoneum and all the organs of the body free from tuberculosis.

EXPERIMENT III.—This experiment was an exact repetition of the preceding one, save that 22 days had elapsed between the intra-venous inoculation and the death of the horse from whose muscles the juice was obtained.

The two guinea-pigs were killed 26 days after inoculation, and both were found to be free from any trace of tuberculous lesions.

The view that the blood-stream is the carrier of tubercle bacilli in most if not all cases of tuberculosis has within recent years repeatedly been expressed, and it may be said that this view is tacitly subscribed to by all those who demand total seizure as the only safe method of dealing with the flesh of tuberculous cattle, for if the muscular tissue in general is the seat of the tuberculous virus it can only be in consequence of the arrest of tubercle bacilli circulating in the blood current. There does not appear to me to be anything like sufficient evidence to prove the correctness of this opinion. Indeed, I would go further, and say that the available evidence furnished by experiment, or drawn from a consideration of the common distribution of the lesions in natural cases of bovine tuberculosis, abundantly warrants the conclusion that in the vast majority of cases tubercle bacilli are not carried by the blood-stream, and that there is no general infection of the muscular or glandular system.

I intend on another occasion to revert to the evidence regarding this point that is derivable from the distribution of the lesions in cases of natural and experimental tuberculosis in the larger animals, but in the present article I wish to review the experimental evidence relied upon by the advocates

of total seizure to prove the virulence of the blood in the first instance, and the mass of muscles secondarily.

At the Fifth International Veterinary Congress, held in Paris in 1889, M. Butel, who may be said to have initiated the crusade in favor of total seizure, submitted a table showing the results of the experiments published at that date regarding the virulence of the blood in tuberculosis. The experiments quoted were as follows:

Experimenter.	Number of Inoculations.	Positive Results.
Villemin . . .	3	3
Gosselin . .	13	8
Toussaint . . .	5	5
Galtier . .	11	2
Jeannel . . .	24	10
Total, . .	56	28

At the Congress for Tuberculosis (Paris, 1888) Nocard described an experiment which ought to have been included in the above list. He injected 1 cm. of a virulent culture of tubercle bacilli into the auricular vein of a rabbit, and four hours later he withdrew from the animal's jugular 1 cm. of blood and injected it into the jugular of another rabbit. The latter when killed three months after inoculation was found to be free from tuberculosis.

Since the above date Professor Bang, of Copenhagen, has published the largest series of experiments of this kind yet placed on record. He inoculated defibrinated blood from 20 tuberculous cows into 38 rabbits and 2 guinea-pigs, the quantity of blood injected being in no case less than 5 cc., and in most cases from 10 to 18 cc. The inoculations with the blood of 18 of these cows yielded negative results. In one of the cases that yielded positive results the cow was the subject of acute miliary tuberculosis; in the other positive case only one of the rabbits had insignificant tuberculous lesions, and the other similarly inoculated escaped.

If to the experiments given above in M. Butel's table we add those by Professors Bang and Nocard, and the 5 by my-

self previously described, there is brought out a total of 82 experiments, of which 52 were negative and 30 positive.

Now, if it were a fact that out of 82 cases of bovine tuberculosis selected at random in the slaughter-houses the blood had been proved virulent in 30 cases, hardly any one dare raise his voice against the general enforcement of total seizure. But at the same time it is right to observe that this would by no means prove that the risk of human infection from tuberculous carcases, even with partial seizure, would be great, for it hardly needs to be pointed out that the subcutaneous or intra-peritoneal inoculation of relatively large quantities of blood is probably a much more certain method of infection than the ingestion of under-done or even raw flesh, and that the guinea-pig and rabbit are probably much more easily inf cted than human beings.

But when the particulars of the cases cited in M. Butel's table are examined the evidence in support of the frequent virulence of the blood is found to be much weaker than it appears at first sight. The majority of the experiments quoted were made not with the blood of bovine animals but with that of small rodents, and it is quite inadmissible to immediately apply positive results obtained in the rabbit or guinea-pig to animals of the ox species. No one familiar with the common course of a tuberculosis infection in rabbits and guinea-pigs can deny that in these animals the blood within a comparatively short space of time becomes contaminated with the bacilli. The distribution of the tuberculous lesions in the viscera leaves no doubt on that head. But the march of events is very different in the bovine species; in them the progress of the primary lesions is in comparably slower, and it is only in quite exceptional cases and at a late stage in the disease that the lesions assume a distribution such as is almost constant in the guinea-pig or rabbit within at the most a few months after infection. Again, experiments made with the blood even of a bovine subject, provided that the lesions are those of a general miliary tuberculosis, are beside the mark, for no one disputes the necessity of total seizure in such cases.

Finally, it may be objected that any experiments of this nature, whether with blood, meat juice, or other materials taken from tuberculous carcases, are almost valueless unless the most scrupulous care has been taken to prevent accidental error. We know that the neglect of such precautions at one time led otherwise careful experimenters to conclude that various non-tuberculous products were capable of setting up a true tuberculosis.

When the before-cited experiments with blood are criticised in the light of these objections, it is found that the majority of them fall to the ground. Thus Jeannel's entire series of 24 were made with the blood of rabbits and guinea-pigs. At least 1 of Toussaint's experiments was made with blood from a pig that was the subject of generalized tuberculosis. Again, 2 of Galtier's experiments were made with the blood of tuberculous rabbits, and the other 9 with blood from the tuberculous carcases (of cattle) condemned as unfit for human food, and therefore presumably affected with general tuberculosis. From these considerations alone, and without insisting on the fact that it is not expressly stated that sterilized instruments were used at every step of the operations, the entire experiments of Jeannel and Galtier, and in part those of Toussaint ought to be eliminated from M. Butel's table. Unfortunately, I am unable to the give detailed report of the 16 experiments by Villemin and Gosselin, but I think it is highly probable that they also are open to one or other of these objections.

It is worthy of note that Professor Bang's experiments are expressly stated to have been made with blood from "extremely tuberculous cows," several indeed having had lesions indicating a generalization of the disease. And if, for the reason already given, we put aside the positive result obtained in the case of the cow that was the subject of acute miliary tuberculosis, out of 36 rabbits and 2 guinea-pigs inoculated with relatively very large doses of blood only 1 rabbit was found to be infected, and in it the lesions were insignificant. Considering that the other rabbit used in the same experiment remained healthy, Professor Bang would probably him-

self admit that the one positive result is within the limit of accidental error.

I do not wish to attach undue weight to the small number of experiments made by myself, but it cannot be denied that the negative result of those made with the blood of horses is diametrically opposed to the view that the blood can be the carrier of tubercle bacilli in any considerable proportion of cases, or for any considerable period. The belief that in any circumstances tubercle bacilli multiply in the blood-current, or even for any length of time continue to make the round of the circulation, is probably unfounded. In support of this statement and in corroboration of the results obtained in these experiments with tubercle bacilli, I may cite the experiments of Chauveau (quoted by Frank and Lubarsch),[1] who found that even anthrax bacilli when injected in enormous numbers into the blood-stream, are very rapidly filtered out in the capillaries of the various organs.

Turning in the next place to the published experiments with meat juice, one finds a condition of things which at the first glance appears to tell strongly in favor of the contention that tubercle bacilli are not infrequently harbored in the muscular system of tuberculous animals. Thus, a table compiled by M. Butel in 1889 showed the general result at that date to be as follows:

Experimenter.	Number of Experiments.	Positive Results.
Bollinger . . .	12	0
Gratia and Liénaux .	3	2
Peuch . . .	2	2
Galtier . . .	25	6
Veyssière and Humbert	2	2
Arloing . . .	2	1
Nocard . . .	21	1
Total . . .	67	14

To the above list there failed to be added the 3 experiments with muscle-juice from horses referred to in this article

[1] Zeitschrift fur Hygiene, Elfter Band, zweites Heft, p. 259.

and a further series of 14 experiments carried out by myself at the request of Professor Brown. These later experiments were made with the juice from the muscular tissue of tuberculous carcases condemned as unfit food at the Edinburgh Abattoir,[1] and the result in every case was negative. When these two series are added we obtain a total of 84 experiments, of which 70 had negative and 14 positive results.

But here again a scrutiny of the experiments brings out a result much less unfavorable to the muscle-juice than is at first apparant.

The 2 experiments of Peuch must be put aside, for the cow from which the juice was obtained in the first experiment was obviously the subject of a general tuberculosis, since the lesions are stated to have involved the lung, pleura, peritoneum, bronchial and intestinal mucous membrane, mesenteric, bronchial and submaxillary glands, and even the bones; and in the second experiment the juice was obtained from the muscles of a fowl dead from generalized tuberculosis. It may be observed that there is thus a double objection to the validity of the second experiment; for there is strong reason to suspect that avian and mammalian tuberculosis are distinct diseases. As was remarked in speaking of the experiments with blood, it is useless to cite experiments made with carcases in which the lesions indicate a generalization of the virus, for no difference of opinion exists as to how such carcases ought to be dealt with.

The same objection holds good with reference to Galtier's experiments, for while it is not perfectly clear from his report that the animals furnishing the muscle juice were all the subjects of a general tuberculosis in the strict sense of that term, they had at any rate lesions sufficiently extensive to determine their condemnation even under a system of partial seizure. It may be worth while to note here that Galtier himself, as the result of subsequent experiments made with raw flesh from tuberculous cattle, has arrived at the con-

[1] The details of these have already been published in the Annual Report of the Veterinary Department for 1890.

clusion that such carcases may with safety be passed for consumption provided the visibly diseased organs be confiscated.[1]

Veyssiere and Humbert's 2 experiments are very far from convincing. No information is given regarding the extent or distribution of the lesions in the two carcases from which the muscular tissue was taken, it being merely remarked that the animals were "in very good condition." Besides, it is not stated that any special precautions were taken in cutting out the flesh or in the other steps of the operation; and although the inoculation was intra-peritoneal, the peritoneum itself appears to have been healthy at the autopsy. There is therefore room for suspicion that the tuberculous lesions in the experimental animals owed their origin to an accidental infection.

The details of Professor Arloing's 2 experiments and those of the 3 by Gratia and Lienaux are not stated in the references to which I have access; but assuming that the animals furnishing the muscle-juice in these 5 cases were not the subjects of a general tuberculosis, and that the experiments are not open to any objection on the score of inadequate precautions to prevent accidental infection, we have remaining from the total of 84 experiments with meat juice 55 that are still valid; and of these 51 had a negative and 4 a positive result.

It might thus be said that there is evidence to show that the muscular tissue of the body contains virulent bacilli in nearly 8 per cent. of cases of apparently (as regards the distribution of the visible lesions) local tuberculosis. But it is surely a remarkable fact that 3 of the positive results were obtained in 2 series with a total of 5 experiments, while in 3 other series with a total of 55 experiments the result was positive in only 1 case. How can one explain the fact that Arloing, Gratia, and Lienaux found the muscular juice infective in 60 per cent. of the carcases examined by them, while 3 other experimenters found it infective in less than 2 per cent.? With results so very discrepant it would almost

[1] Reference in the Centralblatt fur Bacteriologie, 1892, p. 11.

appear justifiable to assume that there must have been a fallacy in the one or the other series of experiments, and, from the smallness of their number, those in which the large proportion of positive results was obtained are most open to suspicion.

CASTRATION OF CRYPTORCHIDS.

By Prof. F. Mauri, of the Veterinary School of Toulouse, France.

(Continued from page 187).

Diagnosis of Cryptorchids.

The diagnosis of cryptorchids involves an inquiry into the general character of the subject and the critical examination of the scrotal region. Excepting for the absence of the testicle in the scrotal region, the animal has all the conformation and appearance of the entire horse, and is spirited, fiery and noisy in the presence of animals of his own species. No practitioner can be mistaken as to the significance of such manifestations. But it is important, from a surgical point of view, to determine whether the cryptorchidy is permanent, whether it is on the right side or the left side, or whether it is double.

In the colt, the testicles have generally descended when he is six months of age; their migration, however, may be delayed to a later period, and may not take place until he has attained his first year or eighteenth month, or even his second and perhaps his third year. It is therefore only when the most extreme of these terms has been reached without the descent of the testicle, that the ectopia can be considered as definite. The presence of a testicle has often been observed at eighteen months or two years at the time of castration, with the dropping of the second organ only six months or a year after the removal of the first. The castration of the cryptorchid is, therefore, only justifiable when he has fully reached his three years. By thus waiting, the animal may complete his development, and this will render the operation easier, besides insuring the benefit of the spontaneous descent of the delayed organ.

It is important at the outset to accurately determine whether the cryptorchidy is on the right side or the left, and this can usually be ascertained without difficulty, since the animal may be seen with one testicle free and properly located, while the other is entirely concealed, with the corresponding scrotum entirely free from cicatrix, which is the positive sign of ectopia. More commonly the visible testicle has been removed, while the descent of the other has been looked for in vain. In this case the absence of the testicle and of the cicatrix of castration in the scrotal region of one side, with one retracted, radiating and in continuity with the cord on the other, are signs which admit of no doubt in the mind of the practiced observer. But it may happen that the gelder has attempted or feigned to castrate on the side where the testicle was absent in such a way as to produce a more or less deep traumatism, and with subsequently a cicatrix. It is easy to distinguish this from the true cicatrix; it is elongated, projecting, and not retracted by the stump of the amputated testicular cord. There are other characters by which double cryptorchidy may be recognized besides those already mentioned, such as the absence of the testicles in scrotal envelopes, as well as that of any revealing cicatrix resulting from an operation. The question whether the cryptorchidy is inguinal or abdominal I view as of little importance, and, like Professor Degive, I never think of it before the operation. Still, the most careful exploration of the inguinal and abdominal regions, whether by direct palpation or by rectal taxis, will not always yield positive data, as I found in my eleventh operation upon a ridgling whose left testicle, of the size of a hen's egg, was situated in the sub-lumbar region, a location which rectal examination was not competent to establish. Mr. Dieriex states that rectal taxis has never enabled him to locate the presence of the testicle suspended in the abdomen. Mr. Degive affirms nearly the same thing, though he is of opinion that "in some cases it may be possible to feel an abdominal testicle, especially when it is comparatively large and sufficiently consistent."

Various Modes of Operation.

The preceding remarks sufficiently indicate the operative method which I have exclusively adopted for the castration of cryptorchids. In both forms of testicular ectopia, the inguinal way seems to me indicated to insure success in the greatest number of cases. According to Van Seymortier, of Andenaerde, this method was practiced by Flemish gelders as early as 1832. The results which have followed in numerous cases in the hands of Parrel, Dieriex, Degive, Capon, Jacoulet and others, as well as my own, appear to me sufficiently satisfactory to entitle it to a place in the first rank of surgical achievement, and to justify its adoption by all practitioners. It is, however, but right to expect that with some improvements in the *modus operandi*, and with the more rigorous use of antiseptic measures, the number of fatal results will be diminished, and that in this way the castration of cryptorchids will enter finally in current practice. I have never thought of trying either the method by incision through the flank, or that through an incision of the inferior abdominal wall near the inguinal ring. I suppose these methods have had their time; that they have been entirely abandoned, and that Mr. Degive refers to them in his work simply as entitled to mention as items properly belonging to a history of surgery. Still, this is not wholly the fact, for at the present time foreign practitioners, whose names are authority, are still preaching these methods, and claim for them great advantages. For example, Nielsen has adopted the improved, classical Danish method, which he describes as follows:

"The horse is cast by the Danish method, having the region to be operated upon turned upward, and the inguinal region being first washed with soap and brush, and then with a tepid phenic solution, an incision ten centimeters (about five inches) long is made in the skin immediately in front of the border of the pubis near the thigh, but always at a short distance from the scrotal region at a point where the abdominal wall is thinnest. The cellular tissue covering the abdominal wall is then divided with the fingers from before backwards,

and the opening of the inguinal canal is exposed. If the testicle is not found, the muscular tissue of the abdominal wall, on a level with the point of the operation, is lacerated with the fingers of the right hand, and the peritoneum torn by a sudden push of the extremity of the first finger, the passage thus made being as small as possible.

"If the fingers fail to detect the testicle, the whole hand is introduced and the organ brought through the wound, and the cord is secured with a caustic clamp. The wound is then sutured in front of and behind the clamp. After twenty-four hours, the clamp is removed and the cord left free. Cicatrization of the wound is assisted in order to prevent any protrusion of the intestines. The operation is performed under the influence of chloroform, and is accompanied by the most thorough and rigid antiseptic measures. After the operation the wound is constantly irrigated with cold water." More recently Ostertag writes as follows:

"In occidental Frisia castration of cryptorchids is done by empirics; few veterinarians care to do it. The first idea of the author was to operate in the manner of Nielsen. In 1887 he operated on a four-year-old horse. By rectal exploration the testicle could be felt floating freely in the abdomen. The operation was quite easy, the assistance of a colleague being secured, who through the rectum kept pushing the testicle through the wound. The organ was fixed to the lumbar region by a short peduncle just long enough to allow the testicle to be brought outside the wound, and to have a clamp applied. The method of Nielsen was followed to the letter, and the wound irrigated with cold water for three hours. Violent colics followed, and after twenty-four hours the symptoms were such that death seemed to be imminent. The clamp was then removed, and the wound still irrigated. On the sixth day the condition of the patient was very bad, repeated injections of morphine giving but little relief. The animal was much depressed, and there was an extensive swelling from the pubis to the sternum. On the tenth day condition was better, but hernia of the intestine appeared. After disinfection the hernia was reduced, and no further compli-

cation were observed. The patient recovered, though with an extensive inguinal hernia which rendered him useless." He continues:

"In the numerous cases in which I have operated I have followed the method of Degive on colts between one and two years old, in which one or both testicles were entirely within the inguinal canal, or where the epididymis was only in the superior opening. I have always seen œdema following the dilatation of the superior opening in the neighborhood of the wound, with high fever, and I have become convinced that the penetration through the inguinal ring is less advantageous than the division of the abdominal muscles and the formation of an artificial tract. And again, I have in many cases, with Mr. Peters, employed a process which I recommend highly, and which I believe has never been described.

"When once the position of the testicle has been well established, the animal is cast on the side opposite to that of the operation and chloroformed, and the posterior leg removed from the hobble and pulled backward. The skin of the flank is shaved and washed, first with soap, and then with a solution of corrosive sublimate.

"The horse is well covered with an oiled cloth pierced with an opening two hands wide; an incision, ten centimeters long, is made below the external angle of the ilium, downward and forward, following the direction of the fibres of the small oblique of the abdomen, and involving only the muscular tissue. This is then divided by a rotary motion of the hand, and the peritoneum penetrated by a sharp push of the fingers. It is a judicious precaution, in order to prevent the introduction of air, to envelop the arm with a cloth moistened with a solution of corrosive sublimate.

"An assistant feels through the rectum for the testicle, and pushes it toward the operator, and when it is brought outside the cord is amputated with the actual cautery and returned into the abdomen. During this manipulation the hind leg must be kept extended backward in order to assist when released in the closing of the wound, which is afterward brought together by sutures and covered with iodo-formed collodion.

"I have never castrated animals with double cryptorchidy, but in all cases of the unilateral form I have obtained rapid recovery when operating through the flank. The after treatment consists in irrigation. The sutures are to be removed after twenty-four hours. The advantages of this method are:

"*First.* The operation is performed while the animal is on his side, while in other methods he must be placed on his back.

"*Second.* The wound is never kept open by the weight of the intestines, and their protrusion is therefore not to be feared.

"*Third.* The after treatment is easier of application upon the flank than in the inguinal region.

"The perforation of the abdominal wall in the Danish method is dangerous, and in cases where the epididymis is in the canal the Degive proofs can be employed. In all other cases my method is less dangerous."

Herm. Putz, referring to the works of Schmidt, Ostertag, Degive and others, thus concludes:

"The results obtained by Danish veterinarians are but little satisfactory. If the operation is performed through the inguinal canal by means of an incision in front of the pubis where the wall is thinnest, or even through the flank, the result is always a doubtful one."

As may be seen by the extracts, the Danish and German veterinarians favor the methods which involve the opening of the peritoneum by incision of either the flank, or, preferably, of the abdomen near the inguinal canal. Notwithstanding the authority of these writers, however, I shall continue to consider these operations as of a very dangerous character, and shall prefer the perforation of the inguinal interstice. Our foreign confreres ought to have sustained their case by reporting the exact number of operations performed, with the results obtained in each case, as, after all, these practical results are the best proofs of the comparative merit of this, as of any other surgical method.

The figures which we have gathered from various publications relate specially to the operation through the inguinal space. For example: Degive reports 9 deaths in 127 opera-

tions, or an average of 7.08 per cent., and Hering, in the last edition of his work, revised by Vogel, describing Stockfleth's and Degive's operation, reports a loss of thirty per cent.

Schmidt gives the details of three operations through the inguinal passage, and reports a letter from Stelkens, who has operated upon 36 animals, with 8 deaths, or a loss of 22.22 per cent. Capon reports three deaths in 10 operations, or a loss of 30 per cent.

Evidently, this variation in the results actually obtained depends a great deal upon the different conditions in which the several operations have been performed.

(*To be continued.*)

AN OUTBREAK OF SCARLET FEVER IN COLORADO.

By Charles Cresswell, M.R C.V.S., State Veterinarian.

A disease of a somewhat mysterious character has been prevalent on the Johnson ranch, near Dolores, Montezuma county, for a period of between four and five years, resulting in the death of several valuable horses, the most noted of which have been the celebrated thoroughbred stallions Jim Douglas and King Faro. During the past year twenty-five horses have been affected, of which seven died. Latterly, the general opinion, among the horsemen and neighbors of the district, was that this disease was glanders. Last week I made a journey there in order to investigate the nature and cause of the disease. On arrival I found one stallion in the first stages and thirteen more or less affected, and several others which had recovered. The recent case had only been affected two days. The thirteen were, with three others—now showing no symptoms of the disease—the remainder of twenty horses turned out in March with the expectation that all would die.

The symptoms of the recent case were: Discharge from both nostrils, enlargement of the submaxillary glands under the throat, and of the parotid glands below the ears, sore throat, high temperature, and injected condition of the lining

membrane of the nasal passages, with the commencement of scarlet and purple spots, and great difficulty in swallowing. These symptoms were common to all the previous cases in the early stages. As a rule the symptoms gradually advanced to increased discharge from the nostrils—sometimes with blood—more or less ulceration of the nasal membranes, swelling of one or both hind legs or between the fore legs, with multiple pustules on various parts of the body, which on breaking off left sluggish ulcers. In cases where the swelling was very extensive the animal died in from ten days to three months.

Of the sixteen animals examined thirteen had more or less discharge of a thick, glutinous character from one or both nostrils. All had either completely healed scars on the nasal membranes, showing a previously ulcerated condition, or had ulcers in now a healing condition; one had perforation of the septum, four had no signs of ulceration either past or present; and ten had more or less enlargement of the glands of the jaw. A mule, which had also been turned out with the horses, and which had the disease in its most acute form together with extreme emaciation, was found to be perfectly healthy and the symptoms had entirely disappeared. Upon a general review of these symptoms, with a history of the disease, it is not to be wondered at that, considering its persistent character on this ranch, it should have been considered glanders.

The main reasons determining a doubt, which afterwards culminated into a certainty, of its non-glanderous character, were that undoubtedly several horses had recovered absolutely, several more were in a fair way to recover and during the whole five years not a single case of direct infection to man or other animals at a distance could be proved; and, finally, the appearance of abscesses which frequently broke at maturity, in several of the cases, which is the rarest circumstance in glanders. Having determined that the disease was not glanders, and not wishing any doubt to exist in the minds of the public, I represented to Mr. Johnson that the only way to settle the question absolutely, was to destroy the worst chronic case for post mortem examination. To this Mr.

Johnson consented, and a young thoroughbred mare having the disease in its worst form, to the extent of complete perforation of the nasal septum, was shot and examined at once. Absolutely no disease whatever of the lungs, spleen or liver was discovered, and no enlargement of the lymphatic glands other than those in and around the throat.

The body was well nourished, all the disease being confined to the septum, and already the process of healing had begun. But the structural changes in the nose and the frontal sinuses of the head, caused by the ravages of the disease, would in all probabilty have rendered the mare useless for racing purposes. The question of glanders having been thus eliminated, the disease was decided to be an aggravated form of what is technically called purpura hemorrhagica, commonly called purpura or scarlet fever form of distemper and its persistence on this farm accounted for—and the chronic alterations of structure somewhat usual in outbreaks of this disease—by the peculiar conditions existing on the farm, hereafter more fully described. This form of distemper is very persistent in its recurrence in a given locality, is especially destructive in its action on all high-bred stock, and is fatal in a large percentage of cases if not properly treated.

It starts with a high fever, injection of the lining membrane of the nose, with first scarlet and afterwards purple spots on the visible mucous membranes, and tumefaction of various glands. If the fever is very high, and runs unchecked, and death does not occur from passive congestion of some important organ, it frequently happens that ulceration of the nostril will take place, and sometimes pyæmia or general blood poisoning from the enlarged glands. And even though apparent recovery should take place after these many changes, it is yet possible for the animal to still retain some subacute disease of the nasal passages. In this case the glands would naturally remain slightly enlarged so long as the disease lasted. One of the principal reasons for its continuance on this farm is, in my opinion, the exceptional hardness of the water, drawn from a suface well sixteen feet deep. It is a well-known fact that water containing a large amount of

gypsum, will, in the thoroughbred, produce a chronic thickening, gradually, of the various glandular structures of the body.

These, in turn, reacting on the system, produce a strong tendency to take in quickly and develop rapidly any disease germs which may be around, and so render malignant what would otherwise be a mild eruptive disease. Then again, when attacked with the disease, no means were taken either to arrest it in its early stages of fever, or by effective surgery to reduce the effect of the abscesses to their minimum amount of damage. It is a characteristic of purpura, when in a malignant form, to affect glands in a deep-seated position, consequently when pus forms it is highly necessary that it be immediately evacuated; otherwise pyæmia or blood poisoning occurs. This necessitates early and practical surgery, and in these cases above described, there is no doubt a great amount of after damage, and in several cases death resulted from want of timely surgery.

The whole history and progress of the disease points to the facts, illustrated in so many instances, that whereas the majority of the natural eruptive fevers of the horse will, in a natural undeveloped horse, assume a non-malignant type, yet in the more artificial animal, under artificial conditions, assume a malignant character, either fatal immediately or very destructive in after effects, if not treated in a scientific manner, and not prevented with especial reference to general sanitary and dietetic condition. The treatment recommended for the prevention and cure of the disease is as follows: For all highly bred stock it is very necessary that they should have pure water, as free as possible from all elements of hardness. In various parts of the country the source of hardness varies, but as a general rule it is sulphate of lime or gypsum, contained in solution by excess of some acid radical.

In a few cases it is sulphide and arsenite of iron, which under abnormal conditions of the digestive system cause a certain amount of arsenic to be set free. Copper and lead will sometimes be present, also mercury in more rare instances. In addition to these mineral impurities, it will some-

times happen that organic impurities from surface leakage into wells will take place, which have a constant action on the glands of the body. In all cases, therefore, of extra hardness of water or of organic impurity, the use of such water should be discontinued for horses kept or raised in an artificial condition. In the cases above there is no doubt but that the exceptional hardness of the water and its close proximity to the stables, was to a great extent the cause of the abnormal glandular enlargements found on almost all the young bred stock on the farm.

The importance of the water supply can hardly be overestimated, as apart from the potency of hard water to cause all catarrhal and eruptive fevers to assume a higher activity, it will arrest development of the animal. In the case of the Johnson horses, if better water cannot be obtained by sinking deeper, the water should be drawn from the Dolores river. It is a fact worthy of note that a wonderful improvement took place in the chronic cases, which were turned out on the river in March. Next in importance as a preventive measure is a thorough cleansing and disinfecting of the stables periodically, and especial attention should be paid to the floor of the box-stalls. These are for the most part of earth, and this should be removed for at least twelve inches, and fresh soil put in, after first covering the old floor with slacked lime. All the walls should be whitewashed with half a pint of carbolic acid in each bucket of wash. The wooden feed-boxes and mangers should be taken out and destroyed and fresh ones substituted.

The chronic cases should be brought up once a week and an ointment of one part of idoform to eight parts of lard inserted into both nostrils by means of a piece of soft sponge attached to a stick. As soon as a fresh case develops, which can easily be determined by the high fever, enlargement under the jaw and scarlet spots appearing in the nostrils, the animal should be at once isolated from the others and the fever reduced by doses three times a day of two drachms of potash, two drachms bicarbonate of soda, and one drachm of chlorate of potash. The throat must either be poulticed con-

stantly with applications of camphorated spirits and glycerine, equal parts, three times a day, or if poultices are impracticable, ap ply in the first instance a sharp cantharides blister, one part of cantharides to eight parts of lard. As the pus in the abscess draws to the surface, lance freely and dress with carbolic oil, one part carbolic acid to twenty parts olive oil.

It is most important that the abscess be operated on as soon as decided suppuration has taken place. Care, of course, must be taken not to cut or injure any of the vessels or nerves, and in many cases only a qualified surgeon can perform the operation. In some instances no suppuration occurs and this is due to the great number of glands previously indurated, together with the high fever, causing a distribution instead of a concentration of the disease. In such cases the early application of the blister is necessary, together with the free administration of the fever medicine. When the fever abates, to be determined by the use of a clinical thermometer, the medicine should be gradually reduced, and the animal allowed a liberal supply of whatever food it will eat or drink, except corn. During the whole fever keep the stables fumigated with burning pine tar, at least once a day, and also allow all affected animals to breathe such occasionally.

This fever has been very prevalent in Colorado this year, there being one hundred cases in Denver during the month of May which came under my notice. Great care and effective surgery are necessary to effect cures without after bad effects, but if taken in the early stages the disease readily yields to treatment. During the early stages of fever and abscess formation exposure is certain death in a large percentage of cases, and the more highly bred the animals of course the greater the loss. Where they can be taken up and cared for on the lines laid down, the loss would be very small and the after effects of chronic disease in the nasal chambers prevented in almost every instance. To sum up, the conclusions arrived at are: Scarlatina among horses has been prevalent in Colorado in many places for several years past. It is far more malignant in character and causes far more losses than ordinary distemper, so called.

Its virulence is increased by anything which tends to cause natural increase in size of the glands in and around the throat and hind legs, notably hard water, or water containing much alkali. Highly bred stock, by reason of its peculiar liability to take on glandular enlargement, is more affected and the disease runs a more severe course. If properly attended to under sound medical and surgical treatment, most cases recover absolutely. If not properly attended to, or the causes predisposing to excessive virulence are not removed, the effects of the disease are either death from pyæmia, or a chronic condition of the nasal passages so much like glanders as to deceive anyone unless the history of the case is known or a post mortem examination made. Most decidedly the disease is not glanders, and it is important that this fact be appreciated at once.

REPORTS OF CASES.

"Careful observation makes a skillful practitioner, but his skill dies with him. By recording his observations he adds to the knowledge of his profession, and assists by his facts in building up the solid edifice of pathological science."—VETERINARY RECORD.

PROLAPSUS VAGINA AND RECTUM.

BY DR. H. FULSTOW, V S., Norwalk, O.

Some time ago I was called to see a two-year-old Jersey heifer that was due to calve in eight days. Upon my arrival I found the patient running in a barn-yard with a small shed in it for her to run in, but which had got so filled up with manure that it was impossible for her to go in without scringing down, and when in she had to scringe in order to stand without her back touching the floor above. On examination found the vagina out as large as a man's head, and very much inflamed and thickened, and covered with filth, and a cut in it about three inches, which was bleeding; also rectum protruding about four inches. Upon inquiry found that vagina had been in and out for three weeks every day or two, and they had kept putting it back, but this time it was so large

they were unable to reduce it, and it was out for three days before I was called. They had also been feeding the animal on chop feed and she was very constipated. The heifer was kept in a barn at night with a floor sloping back, which also kept the case aggravated. I cleansed the vagina with lukewarm carbolized water, and as it still kept on bleeding quite freely, and she strained violently, I gave her a hypodermic injection of morphia, grs. iii, and used a solution of tannic acid and opium on the vagina before replacing it; after replacing it I sewed up the lips of her vulva, leaving an opening below for the passage of urine, and left a solution of tannic acid and opium to inject into the cavity several times daily; also gave her ol. lini, Oiss, and gave her enemas, after replacing the rectum, which stayed all right without further interference, and ordered her fed on mashes and grass. In several days I was called again as the heifer was straining some. I found her down, acting as if labor had commenced, so I removed the stitches and made an examination and found that she was making preparation, and with a little assistance, she delivered a fine heifer calf. After removing the fœtal membranes I washed the uterus and vagina out with a solution of pot. permanganate and replaced vagina, which had come out again, and sewed up her vulva. Kept on using the astringent wash for a few days. I heard from her in about one month; she was all right and giving a good supply of milk.

EXTRACTS FROM FOREIGN JOURNALS.

FROM GERMAN JOURNALS.

By Richard Middleton, D.V.S., Philadelphia, Pa.

*TRICHINÆ DEVELOPMENT IN THE FLESH OF AMERICAN SWINE.

The result of the systematic examination of American pork products, embracing smoked and pickled meats, has been to

*Reprint from the Pathological Institute connected with the Veterinary College at Hanover.

discover a relatively large proportion trichinæ, and this despite the enforcement of the Act of March 3d, 1891, which provides for the microscopic supervision of meats intended for export trade. The same report has been rendered from the cities of Dusseldorf, Crefeld, Emmerich, Bremen, Leipzig, Altona, Posen and Koblenz.

It consequently becomes of immense import to the sanitary police to determine if the micro-organism is annihilated by the process of pickling through which the meat is conserved. Many experiments upon this point have been carried out, but few positive results have been obtained. Mice, rats, rabbits, cats, young swine and guinea-pigs have been the animals used in these trials.

Thickly settled swine meat was fed to rabbits with negative results by Hintzen of Cleve, Ernst of Hildesheim, Schenk and Wagner of Frankfurt-a-M., Frankel and Klaphake of Crefeld; flesh of the same character was fed by Wagner, Schenk and Janssen to cats, pigs, mice, rats and guinea-pigs also with negative results.

Experiments instituted by the Imperial Health Bureau also terminated adversely. Hertwig and Johne have found living trichinæ in American meat (supposed to have been inspected at the port of departure in the United States). Duncker in Dresden and Untersuchen in Hamburg have acquired positive results by feeding the flesh to rabbits.*

In modern times Janssen† has also secured positive results by feeding the affected meat to a rat for twenty-one days. At the end of this time the rodent was killed, and three well developed and sexually mature intestinal trichinæ were exposed—two females and one male. In the former numerous eggs could be discerned, but no embryos.

On the 27th of March, 1892, Supervising Veterinarian Grosswendt delivered to the pathological institute samples of American pork which were so thickly overrun with the parasites that in 0.1 grammes of the same six trichinæ were

*Ostertag, Handbuch der Fleischbeschau, S. 347.

†Berliner Thierarztl. Wochenschr., S. 237, J. 1892.

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found. The latter evidently were possessed of animation, and a portion of the meat was fed to two white mice; these both succumbed the following day from the toxic effect of the concentrated brine within the substance of the muscular fibres fed.

On the same day a rabbit was given bits of this meat, and died on the 22d of June; no trichinæ discovered post mortem.

On the 31st of March two more mice were fed from this same meat, steeped in water, one of which was killed April 4th, but no trichinæ detectable. The companion mouse was kept in a glass jar and continued lively and healthy up to the 15th of June, when it was inoculated with skin from a dead swine, and died of septicæmia. In its muscles numerous examples of the trichina were found, which from their appearance had been imbedded fully three months. They were flexed and rolled upon themselves, possessing a capsule of double contour, somewhat truncated at the termini.

On the 7th of May an inspector connected with the institute received an American ham in which many examples of the worm existed. On the 10th of the same month a mouse and rabbit were fed with portions of this meat; on the 14th the mouse was killed, but no intestinal representatives were apparent. The rabbit, despite careful attention and nourishment, died on the 24th of September, but trichinæ were absent.

Out of seven endeavors at transplantation, all of which were favorable in the minutest detail, to the propagation of the worm, only one was successful. It is of interest to recount the opinions in mitigation of this conclusion, which are promulgated by the various authors and investigators.

The Royal Health Office advances as a cause of negative results, the fact of the meat being too strongly pickled or excessively smoked. Klaphake†, of Crefeld is of the opinion that the various steps and substances incidental to and used in the conserving process are calculated to destroy the trichinæ

†Ostertag, Zeitschrift fur Fleisch u Milchhyg., B. ii. H. 4.

in Atlantic transit. In confirmation of this supposition we have the experiments of Frankle and also of this establishment.*

The former states expressly† that he used hams in his trials that had previously been pickled; notwithstanding the minute strength of the brine the trichinæ were killed by it.

At the institution we applied meat that was so intensely salted as to cause death from sheer thirst, even after we had soaked it in water a short time before feeding it.

In a later trial we used the same meat, but permitted it to remain a period of several hours in water, previous to administering. This gave positive results. Up to the present time we cannot assert the reason for the immunity possessed by the trichinæ in the latter instance in which, moreover, the brine was unusually strong.—*Berliner Thi. Woch.*

PERNICIOUS ANÆMIA IN THE HORSE.

We were lately called by the owner to attend a young horse which had for six weeks eaten indifferently, and which was gradually losing flesh. The slightest work was sufficient cause for a profuse perspiration and weakness which threatened to precipitate the animal to the ground.

Status Præsens.—Emaciated dark brown gelding of medium weight, five years old; the coat without lustre and dry; patient exhausted and standing with drooped head in the stall; countenance languid and immobile; visible mucous membranes, anæmia, and almost white in tint; the corporeal surface of the same degree of heat, rectal temperature 102° F.; pulse unusually weak, wiry and beating 72 per minute; heart tones indistinct, only one being appreciable; contraction, however, strong; respiration labored, and occurring twenty times in the minute; percussion of the thoracic walls, and auscultation of the lungs, indicated nothing abnormal; as well could we observe no lesion of the digestive tract; urine

*The Patho-Biological Institute of Hanover Vet. Univ.

†Ostertag, Zeitschr. fur Fleisch u Milchhyg., B. ii., H.10

could not be secured; along the abdomen, extending from the xiphoid appendix to, and including the prepuce, a considerable œdematous swelling; the sheath was immensely enlarged. Small amounts of blood drawn from the jugularis and microscopically examined, did not contain a superabundance of white corpuscles. The red variety of these, however, appeared paler, longer, and indented by numerous fossæ. Prognosis unfavorable; therapy, ferrum and digitalis.

Death overtook the patient on the third day. The section revealed the blood vessels only partially dilated, and occupied by a watery quality of blood. All the serous membranes were characterized by ecchymotic points—the pericardium being especially so. The cardiac muscle itself was tender, pale and brittle; muscular portion of the general anatomy also possessed this quality to some degree. Upon the other organs, excepting the spleen, which was somewhat enlarged, nothing noteworthy was found.—*Berl. Th. Woch.*

INHERITANCE OF RABIES IMMUNITY.

The investigations relative to the transmission of immunity to certain diseases from the parent to the offspring, have been conducted upon two different lines of procedure.

Firstly, with respect to the germinal transmission, i. e., either through the spermatozoa or the ovulum.

Secondly, as to the result of sanguinary and nutritious interchanges between the mother and fœtus of a natural immunity, or that induced by vaccination.

It has been determined that exemption may be conveyed by the immunized female to its young through the fluids passing from the maternal to the fœtal body. Experiments upon the germinal transmission through the sexual organisms have terminated negatively. Ehrlich, who has probed this question accurately, does not believe the egg or the semen capable of transplanting—in the true meaning of the word—the freedom from disease.

The authors (Prof. Guido Tizzoni and Dr. Eugenio Centami) have had their observations directed to the germinal

transmission through spermatozoa. These gentlemen took three males of different mothers, which they immunized against rabies; the females supplied to these were susceptible of rabies, but in the most intense degree were immune to tetanus. The result of these trials is concisely given in the following:

First. The father may impart per the semen an acquired freedom from rabies.

Second. The same is not influenced by the mother, as the rule holds good when the father has access to several females.

Third. The inheritance is given to all children to the same extent.

Fourth. The immunity is less comprehensive in the children than in the father.

Fifth. The protection, when acquired by the semen, is permanent, which fact is in opposition to that produced by the blood or milk from the female.—*Centralblatt f. Bact. u. Par.*

THEORY AND PRACTICE IN MEAT INSPECTION.

It is evident at the present day that meat poisoning is almost exclusively caused by the consumption of the flesh of such animals as have suffered from septic or pyæmic processes. Doubt as to whether the meat inspection remains applicable to all such cases has led the author to relate the following:

First case, a cow, systemically febrile, and showing symptoms of such indisposition, exhibited enlargement and disease of a quadrant of the udder accompanied by the usual pain, heat and hyperæmia. Diagnosed mastitis septica.

The microscopic character of the disease discharges could not be disputed. The swelling included the anterior quarter of the udder upon the affected side. General condition continued to decline, so slaughter was advised. Upon the meat there was nothing indicative of the intra vitam affection, and the same was passed by the inspector as conditionally healthy. Examination of the mammæ showed it to be four times its

usual dimensions; every quarter was surrounded and intersected by a hyperplastic, gelatinous tissue, which upon the left half of the organ was infiltrated with a reddish brown serous material which could be expressed. The subject, then, was one of parenchymatous and interstitial mastitis associated with phlegmonous œdema. Upon the other organs nothing more was discovered. In all probability a general septicæmia had already acquired a foothold.

Second case, also a cow, had manifested for three months partial loss of appetite, and suddenly declined all food. The animal was systemically affected and very languid; temperature 105⅘° F., local lesion not apparent. A septicæmic process was diagnosed, but upon the cause of which nothing definite could be recorded.

Post-mortem.—A bloody, gelatinous œdema could be noted subcutaneously along the spine and tarsal joints. In the abdominal cavity, with the exception of a slight swelling of the spleen and opacity of the parenchymatous organs, nothing unusual; nothing of note in the thoracic cavity. Between the liver and diaphragm, and along the posterior vena cava, the same gelatinous material could be seen. Upon opening the right auricle, a tumor the size of an apple, and containing pus, could be seen disposed beneath the tricuspidalis. The endocardium ulcerated. We diagnosed septico-pyæmia and ulcerous endocarditis as the cause of the symptoms. The inspector here also passed the meat as conditionally fit for food.

In both cases the consumption of the meat caused no sickness. This circumstance has induced the author to enumerate the following facts:

In both animals the disease was of a local nature, primarily circumscribed, though later causing a general septicæmia.

That such flesh may be eaten with impunity is a truth which has been many times confirmed.

It is known that septicæmia is a process caused by decomposition of the blood accompanied by the formation of a toxic by product. This latter being carried to all tissues by the circulation produces its pathological effects; when, however,

the blood is drained from the vessels, as in slaughtering, the dangerous principle leaves the body, and post-mortem does not produce appreciable changes in the meat.

Animals having suffered the affection only a short while are to be more favorably considered than those slain possibly only a short time before a natural death.

It is also known that the meat of septicæmic patients becomes rapidly foul after death, and the poisonous product, traces of which undoubtedly remain in the carcass, greatly increases. The danger enhances with the length of time between slaughter and consumption.

In meat poisoning, these changes after death are an important factor, whose virulent character is not always annihilated by boiling.

The foregoing premises lead to a simple and inevitable conclusion, which naturally excludes the use of such meat in the manufacture of sausage.

It may further be observed that the time of year and condition of the weather materially influence the process of decomposition.—*Schweizer Archiv.*

FROM ENGLISH JOURNALS.

TUBERCULOSIS IN THE DOG.

By Stewart Stockman, M.R C.V.S.

The history of this case is thus reported: The dog was fourteen years old, and had been kicked by a horse a short time previous to his being brought in for treatment, and after the animal's death the following interesting and amusing history was obtained: About eighteen months ago the animal was engaged in an *affaire de cœur*, which necessitated his staying out late at night. It had even been noticed on more occasions than one that his bed had not been occupied over night. This unseemly conduct in one old enough to know better, did not go unpunished. His constitution was undermined, as the result of his dissolute course of life, and was unable to resist the effects of the wintry blasts which were

then in season, and he fell a victim to what his master described as a severe cold, and continued to cough and expectorate for about one month, when the cough ceased. At this time the dog was in poor condition, with an appetite either lacking or perverted into a morbid craving for putrid material. He also suffered from continual thirst, and showed signs of exhaustion after the least exertion.

The symptoms present were a slow and painful walk; a pulse accelerated and occasionally thrilling, and a hurried respiration. Pain was manifested by a complaining whine when the animal was raised from the ground. Percussion betrayed dullness on both sides of the chest up to the angles of the ribs, and above this the sound was tympanitic. Hyperresonance was especially marked at the posterior upper third on the left side. On auscultation the friction sound was still present in the upper part of the chest, but there only. In the lower part, the vesicular murmur was absent, except when the patient was placed on his back. The same result could be brought about anteriorly and posteriorly by elevating either the fore or hind quarters. The heart sounds were replaced by one of a booming character on both sides at the upper part of the chest. Hydrothorax was diagnosed, and thoracenthesis performed, a considerable amount of fluid escaping, and two minutes afterward the dog died.

At the *post-mortem* a pint of fluid was found in the chest; the lungs were adherent to the thoracic walls; a few yellow spots were found on the pulmonary pleura; the left lung was converted into an inflated cavity, the walls of which were composed of shrunken lung tissue, adherent to the chest wall at the upper posterior part. The cavity contained a quantity of caseous material, which on straining showed numerous tuberculous bacilli. The heart was hypertrophied, the pericardium thickened, and the liver was full of blood, the other organs being normal.—*Journal of Comp. Path. & Ther.*

CHRONIC INTERSTITIAL NEPHRITIS IN THE DOG.

By Henry Gray, M.R.C.V.S., London.

A dog aged eleven, which was kept in the best hygienic condition, had for some time been affected with excessive thirst, often drinking an unnatural quantity of water, with a naturally corresponding increase in the irritation. He had occasional epileptic fits. The author was consulted on account of the dog's yelping when suddenly touched or made to move, or when going either up or down stairs.

Symptoms.—Spine arched; coat dry, harsh and without gloss; dejected appearance; gradual emaciation. The yelping occurred when he was touched suddenly on the loins, the scapulæ, the face or the tail, but not if firm pressure was used. There was obstinate constipation, polydepsia and polyuria. He took but little notice of his master; preferred the recumbent position, curling up, and being very careful in lying down; preferred water to milk, though the appetite was poor; breathing at times accelerated; pulse hard and frequent.

At the *post-mortem* every organ was normal except the kidneys, which showed well advanced lesions of chronic interstitial nephritis.—*Ibid.*

LIPŒMIA IN THE DOG.

By the Same.

This patient was a thirteen-year-old black-and-tan bitch, which had been travelling with her owner, and was always clean in the house until lately when she had acquired dirty habits. She had showed symptoms of partial paralysis, but had eaten well until recently, and yet had lost most of her obese condition.

Symptoms.—Wasted condition of the hinder parts from loins backward, especially the thighs. The animal was disinclined to move voluntarily, and frequently assumed the semi-recumbent position. When made to move she seemed to throw the hind quarters upward from off the ground, in order to regain the use of her feet, and at every step she took

the posterior limb upon which the weight rested seemed to be rotated outward at the stifles. The anterior limbs were also wasted, but their temperature was higher than that of the posterior. The appetite declined, the animal became dull, dazed and listless, and died.

Post-mortem. — On slitting the posterior vena cava, the blood which flowed from it contained what appeared to be particles of fat. The heart had undergone extensive fatty changes, but the cavities contained no blood. This fluid from the thoracic vessels was of a dark greenish tint and fatty looking. The ribs of the left side, from the third to the eleventh, were fractured, most of them in two places, at the neck and the central third.—*Ibid.*

TUBERCULOSIS IN THE DOG COMPLICATED WITH ASCITES.

By E. W. Hoare, F.R.C.V.S.

The patient was a thorough-bred bull-dog two years old, which, when first seen by the author, was lame in the right hind leg, said to be occasioned by injuries received by being run over by a car. He was treated for his lameness and improved.

At that time he did not look like a healthy animal, though his appetite was moderately good; but shortly after this period he seemed to pine away, and the abdomen began to enlarge, continuing gradually to do so until it became enormous in size, the remainder of the body looking, meanwhile, like that of a skeleton. The visible mucous membranes were pale; the pulse weak and irregular; the respiration labored; appetite gone; bowels obstinately constipated.

Paracentesis abdominis was performed, with a temporary relief. Then the liver was found much enlarged, but without jaundice or vomiting. Stimulants, laxatives, bandages over the abdomen all failed to relieve, and the animal died without a struggle. At the *post-mortem* the liver was found enormously enlarged and almost a mass of white growths, which in some parts had broken down into cavities. The peritoneum also was covered with small growths, and a few were

found on the spleen. The lungs, with the exception of a few very small growths at the lower borders, were healthy, as were the pleura. The specimens examined under the microscope proved to be of a tuberculous nature.—*Veterinary Journal.*

EXTENSIVE RUPTURE DURING PARTURITION.

By C. E. Dayus, M.R.C.V.S.

On Monday night, the 15th inst., I was requested by R. J. Mann, Esq., the Home Farm, Acton Burnell, to at once attend a parturition case in a mare. From the messenger I elicited the following history of the case: The patient, a well-bred Yorkshire coaching mare, had gone a fortnight over the natural period of utero-gestation, and was first observed to be in a little pain that morning, but had afterward become quite easy, and had been turned out in the paddock, where she had remained grazing most of the day.

About 7 P.M. she was taken with labor pains, and was placed in a loose box, her owner thinking she would foal immediately. She was left until 9 P.M, then finding that she remained about the same, I was sent for. Upon arrival I was met by Mr. Mann, who said, "We have got the foal away alive and with little trouble, but most strange to say, it came through the rectum," which upon examination I found to be the case.

The anus was considerably lacerated, as was also the rectum, being completely divided from the single colon, about two feet of which were hanging out through the anus. Upon examination per vagina I found that the os uteri was slightly dilated, admitting of but three fingers. Knowing that the uterus must be ruptured, and the patient being in a state of collapse, I ordered her to be at once destroyed.

Post-mortem examination revealed an extensive rupture of the os, rupture of the single colon, and laceration of the rectum. Upon questioning the attendants I gathered that the mare had given several very heavy throes when suddenly the foal's head and two fore legs were protruded through the

anus. They then pulled, and with little difficulty the mare was delivered. The foal lived about a week and then died.—*Veterinary Record.*

EVERSION OF THE BLADDER IN A MARE.

By Robert W. Clarke, M.R.C.V.S.

On Wednesday, the 17th inst., at 9 P.M., I was called to attend a mare which had foaled without assistance sometime during the previous night, the foal being alive and to all appearance healthy. I was told that she had not "cleaned," and was paining hard. On my arrival I found the mare wandering round the box, occasionally stopping and stretching out as if to urinate, and being unable to do so she would pain as in parturition, and in so doing a purple body was just visible between the labiæ of the vagina, which had been mistaken by the owner for the fœtal membranes. On examination per manu I felt what I at first mistook for a pedunculated tumor attached to the floor of the vagina, about as large as a cocoanut, and which, when the mare was at rest, lay on the floor of the vagina between the neck of the uterus and its attachment to the vagina, but which when the mare pained was forced outward, so that a portion of it was visible. On parting the labiæ, two circumscribed patches about the size of a shilling were seen, one on either side; and this, together with the position of its attachment to the vagina, convinced me that it was the bladder, and the two patches, like raised blisters, were the openings of the ureters. I immediately administered one ounce of chloral hydrate to relieve the pain, and after squeezing as much blood as possible out of the tumor, I passed a small cane with a round knob about one inch in diameter into the vagina, and pressing the knob on to the fundus of the bladder I turned it toward the urethra and pressed gradually until the bladder, after a little opposition as the knob of the cane was passing through the urethra, was easily returned to its natural position. The mare immediately ceased paining, and though she suffered from some inflammation of the bladder for a few days, answered to treatment, and

has quite recovered. I believe this to be rather an uncommon condition, and have no doubt that the bladder was forced inside out during parturition; also that it was owing to the extreme debility of the mare that such a condition occurred, as the mare had been worked very hard up to the day before parturition.—*Ibid.*

RUPTURE OF STOMACH.

By John E. Miller, M.R.C V.S., Keyingham.

On the 31st of January I was called to attend a cart mare. It had been all right at 6 o'clock in the morning, taken its usual feed, and went to work on a plough with its fellow horse. The feed consisted of chopped food with Indian corn. At 8 o'clock the animal showed signs of gripes, and I was called to attend.

The animal was uneasy, pawing with the fore feet and frequently wanting to lie down; the breathing was hurried and there was heaving at the flanks. Pulse quickened, ears warm, mucous membrane not much disturbed, and curling of the lip. The animal had not passed any dung. I proceeded with the following treatment: I gave the animal an ordinary colic drink, containing a solution of aloes; I called to see my patient an hour later when it seemed no better, so I then gave a dose of chloral hydrate. At noon she was no better and could not be kept on her feet from pain. She continued to roll about, the breathing was more quickened and heaving of flanks more pronounced, whilst membranes had become highly colored. I then took about two quarts of blood from her, after which she gave another roll and got up again, and standing with her legs apart commenced to perspire profusely—as if some one was turning water on her. Her countenance was anxious and she looked round to the side of her chest. After that she made several attempts to go down, but was afraid to do so. In about half an hour later she went down suddenly and died right out.

On *post-mortem* I found the stomach ruptured towards the pyloric orifice, some of the contents of the stomach among

the bowels, and also the stomach partly loaded with undigested food. I came to the conclusion the animal had been over-fed, thus causing indigestion and over distension, and that the rupture was caused by mechanical violence due to falling and rolling.—*Ibid.*.

EQUINE HYSTERIA. (?)

The following case has occurred in my practice, and thinking it may be of interest to some of your readers I forward particulars.

Last Tuesday evening, the 9th, about 9:30 P. M., I was requested to attend at one of the yards under my supervision. The message delivered to me was, "Please come up at once as there is a mare gone mad." Upon arrival at yard, I found patient a five-year-old mare that had been in the company's service about three months; she was standing in the same stall occupied by her since she had been in the yard. On attempting to approach her she became absolutely mad, and fought at me with her fore legs. Upon going behind her she kicked viciously. When left alone she stretched herself out till her body was nearly on the ground, and made a most peculiar noise, something like a pig under a gate. I removed other horses away from her and got a long rope round her neck, pulled her round and attempted to take the pulse, examine membranes, etc., but I could not get anywhere near her, about every five or six minutes she would raise herself on her hind legs and fight. As I was of opinion that any treatment was out of the question, after a lot of trouble I got her to move and had her taken down into a loose box, and there left with a man to watch her so that she did not get cast. She amused herself by keeping up the same noise for about five hours, walking round the box and occasionally kicking the door.

I saw her again next morning, Wednesday, about 8:30 A. M., she was perfectly quiet, feeding all right, pulse 48, temperature 101.4°; but she had been in œstrum to a degree I never saw equalled.

I have been in practice twenty years and have never seen a case like it before. If this was a case of uterine hysteria in the mare they are very rare, and I cannot think it was due to cerebral disease, as the mare so soon resumed her normal condition.—*Ibid.*

REMARKABLE CASE IN A FOAL.

By John Barr, M.R.C.V.S., Halvergate, Norfolk.

My object in relating the following case is merely to place it on record. I cannot recollect having heard of a similar case, and although there is not much useful information to be derived from it, I hope its extraordinary nature is sufficient to warrant my object.

On Monday night (3d inst.) I was called upon to assist a mare in the act of foaling. There was not much wrong with the position of the foal, the head and neck being merely depressed and lying between the fore legs, and inasmuch as these were in the vagina I had little difficulty in getting the foal. Having removed the foal and seeing nothing further amiss I left, but almost immediately thereafter the man in attendance noticed the foal straining, and on looking to see if there had been any fæces passed he observed a mass of intestine protruding from the anus. Within half an hour of the birth of the foal I was again in attendance, and found on examination that the protruding mass consisted of small intestine and mesentery, with a small portion of everted rectum which was intensely inflamed. I considered nothing could be done to benefit the little sufferer so I advised slaughter.

Post-mortem examination next day revealed a rupture three inches long in the rectum, the mucous membrane of which was inflamed throughout. The protruding portion of the ileum measured four yards, and before death had become strangulated.

Was the rectum inflamed before birth, and did the rupture occur before or after? I am at a loss to ascribe a cause or fix the time of the pathological changes.—*Ibid.*

FROM FRENCH JOURNALS.

SOME EXPERIMENTS UPON THE PHYSIOLOGY OF THE PNEUMOTHORAX BY PENETRATING WOUND OF THE CHEST.

By MM. Rodele and Pourrat.

In this interesting experimental work, the authors have considered, first, the condition of the air introduced in the pleural cavity, and then the disturbance brought on in the pneumothorax by the functions of respiration and circulation. All the experiments were made on dogs.

First. After introducing into the pleura measured quantities of sterilized air by an opening in the thoracic walls, sufficiently small to allow a free communication of the pneumothorax with the external atmosphere, they killed the animals after a variable number of days, and measured and analyzed the remaining air. Following are the results obtained from the contents of the book:

The quantity of air thrown into the pleural cavity gradually diminishes. The resorption, which was soon followed by its complete disappearance, was accompanied by evident changes in the composition of the gaseous mixture; the oxygen diminished, and the carbonic acid immediately took its place in increasing proportions, to be afterward resorbed in proportion to the other gases.

Second. The disturbances of the respiratory and circulatory functions varied, according as the pleura received the air gradually or suddenly by a free opening; or again, if the pleural cavity was kept in free communication with the external air. A gradual injection of air produced an acceleration of the respiration, with slight amplification of the respiration and an elevation of sanguine pressure. When the air was allowed to enter suddenly through a wide opening of the chest, the respiration was at first accelerated, with a gradual increase in amplitude; but this was only a transient effect, and soon ceased. The wound being kept open, the acceleration was soon followed by a diminution, and the amplitude became still greater. Soon after there were arrests in the inspiratory action, with a gradual diminution of the ampli-

tude until there was complete stoppage of the respiratory movements. If the pulmonary insufflation was made without waiting too long, and it was kept for one or two minutes, spontaneous respiration returned, provided the pleura was kept closed. The simple occlusion of the pleura would have the same result if done after only four or five large respiratory motions; if later it is useless.

In respect to the pulse, there was, first, a period of acceleration corresponding to that of the respiration, and then followed a general diminution until a definitive arrest a little previous to that of the respiration. These disturbances, with the death which soon followed, were the results of the phenomena of arrest and asphyxia.

After the section of the pneumogastrics, the retarded beating of the pulse became more readily perceptible; the accel eration persisted with even greater rapidity; then, some instants after complete cessation of the respiration, it ceased gradually by the diminution of the systoles. The influence of asphyxia was also manifest, the markings of intra-brachial pressure showing that the movements of the thoracic frame were entirely inefficacious upon the chest, open only on one side. How is it that the sound lung itself did not dilate?

The hypothesis of Weill must here be admitted, viz., that of a displacement *en masse* of the mediastinum; the aspiration produced in the sound side by the movement of inspiration may be without effect upon the lung if it exhausts itself in displacing the mediastinum.—*Comp. Rend. Soc. Biol.*

NOTES UPON THE COMPOUND ANTISEPTICS.

By Drs. deChristmas and Respant.

In all the researches made into the nature and operation of antiseptics, the curious phenomena is brought out that by the association of several antiseptic substances possessing similar properties a new body is produced with a microbicide power far exceeding in its peculiar properties that of either of the component substances used singly.

It is upon this data that the authors have made methodi-

cal researches into antiseptic formulas, in order to discover, if possible, a sufficiently powerful combination to destroy microbes, yet, while still in such a degree of concentration, weak enough to be harmless to the organism. The following formulas have given them the best results: Benzoic acid, 1 gramme; phenic acid, 8 grammes; chloride of zinc, 1 gramme.

An aqueous solution of one per cent. of this mixture kills the staphylococcus of suppuration in thirty seconds, and anthrax in the vegetative stage; pyocejanic bacillus, that of diphtheria and that of typhoid fever in one minute. Similar effects are obtained with a one per cent. solution of a mixture of: Phenic acid, 8 grammes; benzoic acid, 8 grammes; oxalic acid, 1 gramme; or with one of 9 grammes of phenic acid and 1 of salicylic acid. The authors have obtained still better results with a degree of concentration of half of that strength.

The last mixture adopted is of phenic acid, 8 grammes, to 1 of salicylic, and 10 drops of English oil of mint.

An aqueous solution, one-half per cent. of this mixture kills the above named organisms in thirty seconds. The bacillus anthracis is destroyed with a solution of 2 at 1,000, which corresponds to an antiseptic strength five times greater than that of pure phenic acid.—*Ibid.*

REFLEX PARAPLEGIA DUE TO THE ACARUS OF THE EAR IN RABBITS.

By M. A. LAVERAN.

The author had watched a rabbit which had paraplegia, with scabs or crusts in the ear. He killed it, and in a careful post-mortem found the following lesions: Both ears were filled with cerumen, and at their bottom were easily seen a great number of small, whitish moving bodies which proved to be acarus. They were present in enormous numbers, and presented under the microscope all the characters of the acarus of the ears of rabbits. There were no lesions in the brain or cord, or elsewhere. From this it seems that the paraplegia was due to the parasites of the ear.—*Ibid.*

EFFECTS OF THYROIDECTOMY IN DOMESTIC ANIMALS.

By M. G. Moussu.

The author has performed complete thyroidectomy upon a dozen adult rabbits, and none have died. Only two were sick, none of the others seeming to be in any way affected, the appetite and strength remaining the same. Those which were sick began to show signs of it in forty-eight hours after the operation. In the first, it was manifested by clonic contractions of the jaws and of the neck, extending after an hour and a half or two hours to all the muscles of the vertebral region and superior parts of the legs. Toward the third hour, the respiration became accelerated and difficult, and the beatings of the heart increased and became tumultuous. General excitation was well marked. The next day the animals were in perfect health.

In the presence of these results, so contrary to those of Mr. Gley, all of whose operations were fatal, death following in every case where he had performed complete thyroidectomy, M. Moussu thought that probably the age of the animals might have had some agency in producing the results. He then operated on seven others, three and four months old, and he then had two deaths after well marked symptoms of general tetanus. The disease showed itself as early as the twelfth or thirteenth hour, and death took place between the fifteenth and twenty-fifth following the operation. Hence, young animals seem to be less able to endure the operation than adults.

The author then experimented upon solipeds, and subjected several horses and a donkey to the complete ablation of the gland, meeting with no accidents; all recovered well and lived. Similar results were obtained among ruminants with cattle and goats.

In the adult pig the operation was also harmless. But in young, sucking animals it gave rise to the evolution of myxœdema. The day of weaning may be deemed the term of organic development of young animals, and later than this, though there may be no acute accident, growth does not continue. Compared with other animals operated on, the young

pigs remained thin and delicate; the skin is rough to the touch; the hair is long, stiff and coarse, and the voice is aborted and plaintive.

From further experiments, M. Moussu says that he believes that by the ablation of the thyroid body any one may, at will, according to the individuals operated on, give rise to cretinism, with atrophic, in the myxœdematous form.

The thyroid body then, has a physiological function which influences the general nutrition, with a well marked effect upon the young ones, evidently much less upon adults, and which is manifested by various, but analagous symptoms, according to the species of the animals.—*Ibid.*

BIBLIOGRAPHY.

NEW PRONOUNCING DICTIONARY OF MEDICINE. By JOHN M. KEATING, M.D., LL.D. (W. B. Saunders, Philadelphia).

A COMPLETE PRONOUNCING MEDICAL DICTIONARY. By JOSEPH THOMAS M.D., LL.D. (J. B. Lippincott & Co., Philadelphia).

These are two new additions to medical literature which veterinarians, and especially students while at college, will do well to possess. Both works are brought out in uniform style, and give the signification, etymology and pronunciation of medical terms. There are also appendices, each relating severally to different subjects. That of Keating gives an important table of bacilli, micrococci, leucomaines, ptomaines, drugs, poisons and antidotes, etc.; while that of Thomas furnishes an explanation of Latin terms, writing prescriptions, tables of doses, of chemical symbols, of the orders and families of living mammalia, and metric weights and measures.

Both works are issued in the form and style of excellence which are characteristic of the publications bearing the imprints of these Philadelphia houses.

DISEASES OF THE LUNGS, HEART AND KIDNEYS. By N. S. DAVIS, JR., A.M., M.D. (F. A. Davis Co., Philadelphia.)

This volume of over three hundred and fifty pages is a component portion of a series of lectures delivered by the author

in the Chicago Medical College. The subjects are divided into three sections, each treating separately of the diseases of the lungs, the heart and the kidneys. Concise in the consideration of the divers chapters which treat severally each individual disease, the author has nevertheless gathered in his work a large amount of interesting material, which may be profitably reviewed and studied by all interested in these branches of pathology.

PATHOLOGIE GENERALE et ANATOMIE PATHOLOGIQUE (General Pathology and Pathological Anatomy). By PROF. C. CADEAC, of the Veterinary School of Lyons, with the collaboration of J. Bournay. (J. B. Bailliere & Sons, Paris.)

This is the first volume of a work known as the Cadeac Encyclopedia, and is designed to comprehend the consideration of the most indispensable topics pertaining to the veterinary profession. *General Pathology and anatomy, semeiology, diagnosis, operative surgery, internal pathology, parisitic and contagious diseases, surgical pathology, obstetrics, sanitary medicine, jurisprudence, legal medicine, inspection of meats, therapeutics, hygiene, zootechny, etc., etc.*

These subjects will be treated in sixteen convenient volumes, in which the student, the practitioner and the layman will equally find treasures of information amply sufficient to satisfy the needs of all classes of investigators.

Repetitions, statements and reduplications of material will be treated with the conciseness necessary to keep abreast with the progress of modern science.

This first volume contains two parts, each of which is divided into sections.

Etiology, in its various aspects, is first considered and is followed by a dissertation upon the phenomena of the action of surrounding media, such as atmospheric pressure, dampness, dryness, light, electricity, etc., etc. The third section is appropriated to the consideration of the influences of the parasites and microbes.

The second part introduces the reader to a view of the various phenomena of congestion, hemorrhage, thrombosis, embolics, gangrene, inflammation and hypertrophy, and is com-

pleted by a careful general and special description of tumors.

The work originated by Professor Cadeac and his assistants is one which is sure to form a most valuable addition to the already extensive veterinary literature of France, and when it is taken into consideration that the cost of each volume is to be within the reach of all (five francs, or one dollar per volume), there can not be any doubt as to the immense financial return which the house of Bailliere & Sons may hope to meet with.

The several parts of the Encyclopedia will be rapidly issued, one volume being promised monthly, and the completed work before the end of 1894.

CORRESPONDENCE.

OHIO STATE VETERINARY MEDICAL ASSOCIATION.

WASHINGTON C. H., O., July 17th, 1893.

Editor American Veterinary Review:

The regular semi-annual meeting of the Ohio State Veterinary Medical Association will be held in Columbus, O., August 30th (evening) and 31st (morning and evening). All members and all graduates are earnestly solicited to be present. Business of great importance to the veterinarians of this State will come up before this Association. Low rates on all railroads.

WM. H. GRIBBLE, *Sec.*

SUNDRY ITEMS.

DR. JOSE M. PERALTA, graduate of the American Veterinary College, has received his degree of M.D. from the Jefferson Medical College.

PROF. W. ZUILL, M.D., D.V.S., who for several years has filled the chair of operative surgery in the Veterinary Department of the University of Pennsylvania, has sent in his resignation. There are rumors that he has been asked to withdraw the same.

BUREAU OF ANIMAL INDUSTRY.—Many members of the Bureau of Animal Industry in the East have been relieved from duty. Is their usefulness at an end, and have all dangers of contagious infection in our cattle been removed?

DR. E. SALMON.—The health of Dr. E. Salmon has been reported very bad for some time back. It is hoped that this will prove a false alarm, and that he will soon be able to resume his special work in the Bureau.

THE NEW ANNOUNCEMENT of the American Veterinary College for the nineteenth session is just out. It is a handy statement of the advantages offered by this ever *go ahead* institution. It is rumored that alterations of great importance are to be done in the buildings now occupied by the college, which will improve the accommodations for students.

THE FIRST NUMBER of the second volume of the *New York Veterinary Journal* presents to its readers several articles of interest to veterinarians. The editors of the journal, though young veterinarians, deserve much credit for their efforts in behalf of their chosen profession.

THE ANNOUNCEMENT of the Kansas City Veterinary College for the year 1893-94 is just out. In the list of graduates are found the following names: O. G. Atherton, Arrowsmith, Ills.; W. M. Bell, Kansas City, Kan.; T. A. Bray, Kansas City, Kan.; T. A. Donald, Lincoln, Ills.; W. G. Hawkey, Belvidere, Ills.; J. P. Patt, Sedalia, Mo.; Ch. Saunders, El Dorado, Kan.

VETERINARY LEGISLATION.—It is reported that Governor Flower of New York has signed what is known as the Woodbury Bill, granting more time to unregistered veterinary practitioners to call on their county clerks and comply with the law. There have been three or four amendments to the original law, and this last is a perfect farce.

A GOOD APPOINTMENT.—Dr. N. P. Hinkley, of Buffalo, has been appointed by the Department of Agriculture to the position of United States Veterinary Inspector at the ports of Buffalo and Niagara Falls. He succeeds Dr. John T. Claris, who was appointed during the Harrison administration. Dr. Hinkley received his commission recently, and since then has filed his oath of office in Washington. He is a well-known veterinary surgeon, and is a native of Erie County, born in Lancaster in 1855. He went to Buffalo in 1870. Ten years later he was graduated from McGill University, Montreal, with the degree of V.S., and from the same institution, in 1890, he took the degree of D.V.S.

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OUR ANIMAL FRIENDS—a monthly issued by the American Society for the Prevention of Cruelty to Animals, contains lots of material interesting to veterinarians, if not directly as professional men, at least indirectly as protectors of animals, as their duties call them to be. Members of such societies and veterinarians are bound to work hand in hand to protect and relieve our domestic animals from quackery and its barbarous cruelties.

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A NEW TREATMENT FOR GLANDERS.—Claudius Nourry and C. Michel have held before the Academie des Sciences (*La Medecine Moderne*, September 1, 1892) that there is a great similarity between glanders and tuberculosis, a similarity that has led them to employ in the first disease the methods of treatment most recently recommended for the latter affection. The authors have tried the following in two cases occurring in the horse: 1, hypodermic injections of creosotated oil to enhance the reabsorption of pulmonary tubercles and granular adenitis; 2, chloride of zinc, in washing out the nasal cavities, to combat the ulcerative destruction of the pituitary membrane. This treatment of glanders is based upon the two methods recommended in the treatment of tuberculosis; the first proposed by Bouchard and followed by Burlureaux,

and the second by Lannelongue. After two and a half months of this treatment, the two horses which suffered from all the classical phenomena peculiar to glanders appeared completely cured. The two animals were killed afterwards, and thus the efficacy of the treatment was verified by post-mortem examination. The creosotated injections were made every hour by means of a Pravaz syringe, at first with oil of the strength of ten per cent., then of twenty-five per cent., and, finally, of fifty per cent. The authors add that Burlureaux failed to observe good results with the injections of creosotated oil in a case of an assistant of the Pasteur Institute, who was attacked by the disease while preparing cultures of the virus of glanders.—*Therapeutic Gazette.*

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